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(54) ELECTRICALLY CONDUCTIVE COMPOSITION AND ELECTRICALLY CONDUCTIVE ROLLER PRODUCED THEREFROM

(57)Abstract:

PROBLEM TO BE SOLVED: To provide an electrically conductive composition and a low hardness, electrically conductive roller produced from the composition.

SOLUTION: This electrically conductive composition comprises (A) a polyisobutylene polymer having at least one alkenyl group capable of undergoing hydrosilylation reaction in the molecule, (B) a compound having at least two hydrosilyl groups in the molecule, (C) an electrical conductivity-imparting material, (D) a hydrosilylating catalyst and (E) a plasticizer. The alkenyl group capable of undergoing hydrosilylation reaction in the polymer of the component A is preferably present at the end of the polymer.

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CLAIMS

[Claim(s)]

[Claim 1] The conductive constituent containing component [following] (A) - (E): Polyisobutylene system polymer which has the alkenyl radical in which at least one hydrosilylation reaction is possible in the (A) molecule;

(B) Compound which has at least two hydrosilyl radicals in a molecule;

(C) Addition-of-conductivity matter;

(D) Hydrosilylation catalyst; and the (E) plasticizer.

[Claim 2] The constituent according to claim 1 with which the alkenyl radical in which the hydrosilylation reaction in the polymer of the aforementioned (A) component is possible exists in the end of this polymer.

[Claim 3] The conductive constituent according to claim 1 or 2 whose total amount of the repeat unit of the isobutylene origin in the polymer of the aforementioned (A) component is 50 % of the weight or more.

[Claim 4] A conductive constituent given in any 1 term of claims 1-3 which is the polyorgano hydrogen siloxane to which the compound of the aforementioned (B) component contains two or more hydrosilyl radicals in 1 molecule on the average.

[Claim 5] A conductive constituent given in any 1 term of claims 1-4 whose amount of the silicon atomic union hydrogen atom in the compound of the aforementioned (B) component is 0.8-5Eq to the amount of the compound of the aforementioned (A) component.

[Claim 6] A conductive constituent given in any 1 term of claims 1-5 whose plasticizer of the aforementioned (E) component is saturated hydrocarbon system process oil.

[Claim 7] A constituent given in any 1 term of claims 1-6 whose aforementioned (C) component is carbon black.

[Claim 8] A constituent given in any 1 term of claims 1-7 from which the degree of hardness (JIS A) of the hardened material which is made to harden said conductive constituent and is obtained becomes 25 degrees or less.

[Claim 9] The conductive platen which any 1 term of claims 1-8 is made to harden the constituent of a publication, and is obtained.

[Claim 10] The conductive platen according to claim 9 whose roller resistance is 107-1011ohm.

[Claim 11] The conductive platen according to claim 9 whose roller resistance is 103-109ohm.

[Claim 12] The conductive platen according to claim 9 whose roller resistance is 105-1010ohm.

[Claim 13] The manufacture approach of the conductive platen which includes the process which makes any 1 term of claims 1-8 harden the constituent of a publication.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]

[0001] [Field of the Invention] This invention relates to the conductive platen produced from a conductive constituent and its conductive constituent. Specifically, the conductive constituent of this invention is related with the conductive platen of a low degree of hardness obtained from the conductive constituent of addition mold-curing nature and it which contain the compound which has at least two hydrosilyl radicals, a hydrosilylation catalyst, a plasticizer, and the addition-of-conductivity matter in the polyisobutylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible, and a molecule.

[0002] [Description of the Prior Art] An electrophotography machine or a printer has as one application of a conductive constituent, for example, the various rollers for form feed etc. are mentioned. As an ingredient used for the elastic body part of these rollers, many EPDM, urethane, NBR, silicone, etc. are used.

[0003] Moreover, the conductive constituent using a saturated hydrocarbon system polymer or a polyoxalkylene series polymer is well-known, for example, is indicated by JP.8-262868A. However, a platen of not necessarily enough low further a low degree of hardness [ingredient / such / conductive / degree of hardness] was desired.

[0004] However, for example, in the application of the roller for electrophotography machines etc., it is needed as physical properties that the above-mentioned ingredient is the low degree of hardness which it does not usually have.

[0005] [Problem(s) to be Solved by the Invention] Especially this invention aims at offering the conductive platen of a low degree of hardness without effect in the printing image by contamination of photo conductors which it has, such as an electrophotography machine, and the conductive ingredient for it.

[0006] [Means for Solving the Problem] This invention persons completed a header and this invention for the conductive constituent for the platen of a low degree of hardness being obtained by adding a plasticizer into the polyisobutylene system polymer which has the alkenyl radical in which a hydrosilylation reaction is possible, and the hardenability ingredient containing the curing agent, hydrosilylation catalyst, and addition-of-conductivity matter which have a hydrosilyl radical.

[0007] The conductive constituent of this invention is a polyisobutylene system polymer which has the alkenyl radical in which at least one hydrosilylation reaction is possible in (A) molecule containing following component (A) - (E);

(B) Compound which has at least two hydrosilyl radicals in a molecule;

(C) Addition-of-conductivity matter;

(D) Hydrosilylation catalyst; and the (E) plasticizer.

[0008] In the one embodiment, the alkenyl radical in which the hydrosilylation reaction in the polymer of the aforementioned (A) component is possible exists in the end of this polymer.

[0009] In the one embodiment, the total amount of the repeat unit of the isobutylene origin in the polymer of the aforementioned (A) component is 50 % of the weight or more.

[0010] It is the polyorgano hydrogen siloxane to which the compound of the aforementioned (B) component contains two or more hydrosilyl radicals in 1 molecule on the average in the one embodiment.

[0011] In the one embodiment, the amount of the silicon atomic union hydrogen atom in the compound of the aforementioned (B) component is 0.8-5Eq to the amount of the compound of the aforementioned (A) component.

[0012] In the one embodiment, the plasticizer of the aforementioned (E) component is saturated hydrocarbon

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[0030] The alkenyl radical in which a hydrosilylation reaction is possible will not be limited especially if it is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an example of such an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, an methacrylic radical, etc. are mentioned. (A) As for a component, it is desirable to have 1-10 alkenyl radicals in 1 molecule.

[0031] However, it is especially desirable from moisture resistance, weatherability, and a heat-resistant viewpoint to consist of saturated hydrocarbon with which the frame of these polymers does not contain an ethylene nature unsaturated bond substantially except for the alkenyl radical in which a hydrosilylation reaction is possible.

[0032] The description of the conductive constituent of this invention is easy to set up the degree of hardness of a hardened material low. In order to make this description easy to demonstrate, as for an alkenyl radical, it is desirable to exist in two or more molecule ends.

[0033] The number of alkenyl radicals is suitably chosen depending on the engine performance of a request of a roller. If there are too many alkenyl radicals, a hardened material will tend to become upright, and good rubber elasticity becomes is hard to be obtained. If there are too few alkenyl radicals, it will fully be hard coming to harden a conductive constituent.

[0034] (A) In preparing the polymer of a component, as an approach of introducing an alkenyl radical, it divides roughly and there are an approach of introducing an alkenyl radical after the polymerization of a polymer and the approach of introducing during a polymerization.

[0035] First, how to introduce an alkenyl radical after the polymerization of a polymer is explained.

[0036] After converting the hydroxyl group of this polymer into radicals, such as -ONa or -OK, and obtaining an alkoxide as an approach of introducing an alkenyl radical after a polymerization, for example using the polymer which has a hydroxyl group in an end or a side chain, there is an approach to which an organic halogenated compound is made to react.

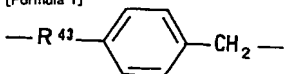
[0037] As an approach of making the hydroxyl group of a polymer an oxy-metal radical, the approach to which a polymer is made to react with caustic alkalis, such as metal alkoxides, such as metal hydrides, such as alkali metal, such as Na and K, and NaH, and NaOCH₃, caustic alkali of sodium, or caustic potash, is mentioned.

[0038] The organic halogenated compound made to react to the alkoxide of a polymer is :CH₂=CH-R41-Y shown by the following general formulas (1), (1)

Y is halogen atoms, such as a chlorine atom and an iodine atom, R41 is a divalent organic radical shown by -R42-, -R42-O-C(=O)-, or -R42-C(=O)-, and R42 is the divalent hydrocarbon group of carbon numbers 1-20 here. R42 is an alkylene group, a cyclo alkylene group, an arylene radical, and an aralkylene group preferably.

[0039] R41 is a methylene group or [0040] preferably.

[Formula 1]



[0041] It is chosen out of (R43 is the hydrocarbon group of carbon numbers 1-10).

[0042] As an example of the organic halogenated compound shown by said general formula (1), although an allyl chloride, an allyl compound star's picture, vinyl (chloro methyl) benzene, allyl compound (chloro methyl) benzene, allyl compound (bromomethyl) benzene, the allyl compound (chloro methyl) ether, allyl compound (chloro methoxy) benzene, 1-hexenyl (chloro methoxy) benzene, allyloxy (chloro methyl) benzene, etc. are mentioned, for example, it is not limited to them. Among these, an allyl chloride is desirable because of a cheap thing and the ease of a reaction.

[0043] An alkenyl radical content polymer with the almost same molecular weight as the polymer which contains the hydroxy group used as a start raw material by such approach is obtained.

[0044] On the other hand, before making the organic halogenated compound of a general formula (1) react, it can be made to be able to react with the multiple-valued organic halogenated compound which contains two or more halogen atoms in 1 molecules, such as a methylene chloride, bis(chloro methyl) benzene, or the bis(chloro methyl) ether, and molecular weight can be increased to obtain the polymer of the amount of macromolecules more. Thus, if it is made to react with the organic halogenated compound shown by the general formula (1) after increasing molecular weight, the polymer (for example, hydrogenation polybutadiene system polymer) which is the amount of giant molecules more, and has an alkenyl radical can be obtained.

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system process oil.

[0013] In the one embodiment, the aforementioned (C) component is carbon black.

[0014] In the one embodiment, the degree of hardness (JIS A) of the hardened material which is made to harder said conductive constituent and is obtained becomes 25 degrees or less.

[0015] In another aspect of affairs of this invention, the conductive platen which is made to harden one of the above-mentioned constituents, and is obtained is offered.

[0016] In the one embodiment, the roller resistance is 107-1011ohm.

[0017] In the one embodiment, the roller resistance is 103-109ohm.

[0018] In the one embodiment, the roller resistance is 105-1010ohm.

[0019] The manufacture approach of the conductive platen which includes the process which stiffens one of the above-mentioned constituents in another aspect of affairs of this invention again is offered.

[0020]

[Embodiment of the Invention] The (A) component used for the constituent of this invention is a polyisobutylene system polymer which has in a molecule one alkenyl radical in which a hydrosilylation reaction is possible at least. A polyisobutylene system polymer means what the monomeric unit which makes the frame of a polymer becomes mainly from an isobutylene unit here.

[0021] A polyisobutylene system polymer can be manufactured by the well-known approach by carrying out a polymerization, using an isobutylene as the main raw material. For example, it can manufacture by the approach indicated by JP.8-134220A or JP.9-71811A.

[0022] A polyisobutylene system polymer can carry out the polymerization of the isobutylene independently, or can carry out copolymerization with a copolymeric monomer, and, specifically, can be obtained. Or after carrying out copolymerization of an isobutylene and the diene series, it can obtain also by approaches, such as the approach of adding hydrogen.

[0023] As for the number average molecular weight (the GPC method, polystyrene conversion) of a polyisobutylene system polymer, 500 to about 100000 are desirable, and its liquefied object which is about 1000 to 40000 number average molecular weight is desirable especially from a viewpoint of a fluidity, the ease of dealing with it, etc.

[0024] A polyisobutylene system polymer may be a polymer which all the monomeric units may be formed [polymer] from the isobutylene unit, and carried out copolymerization of the monomer which has copolymeric to the isobutylene. When it contains such a copolymeric monomer, it is [in a polyisobutylene system polymer] desirable, and the content is 20 or less % of the weight especially preferably 30 or less % of the weight more preferably 50 or less % of the weight.

[0025] As a monomer which has an isobutylene and copolymeric, the olefin of carbon numbers 4-12, vinyl ether, an aromatic series vinyl compound, vinylsilane, and arylsilane are mentioned, for example.

[0026] As an example of the monomer which has an isobutylene and copolymeric For example, 1-butene, 2-butene, a 2-methyl-1-butene, a 3-methyl-1-butene, A pentene, 4-methyl-1-pentene, a hexene, a vinyl cyclohexane, The methyl vinyl ether, ethyl vinyl ether, isobutyl vinyl ether, Styrene, alpha methyl styrene, dimethyl styrene, p-t-butoxy styrene, p-hexenyloxy styrene, p-ant ROKISHI styrene, p-hydroxystyrene, beta-pinene, an indene, vinyl dimethylmethoxysilane, a vinyl trimethyl silane, Divinyl dimethoxysilane, divinyl dimethylsilane, 1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane, TORIBI ni methylsilane, a tetravinyl silane, allyl compound dimethyl methoxysilane, An allyl compound trimethyl silane, diaryl dimethoxysilane, diaryl dimethylsilane, gamma-methacryloyl oxypropyl trimethoxysilane, gamma-methacryloyl oxypropyl methyl dimethoxysilane, etc. are mentioned.

[0027] the monomeric unit in which it is the range where the purpose of this invention is attained by the polyisobutylene system polymer, for example, double association remains after polymerizations, such as a polyene compound like butadiene, isoprene, 1, 13-tetra-deca diene, 1, 9-deca diene, 1, 7-OKUTA diene, 1, and 5-hexadiene, — small quantity — you may make it contain preferably in 10 or less % of the weight of the range in a polymer

[0028] (A) The polymer of a component contains the alkenyl radical in which a hydrosilylation reaction is possible. The side chain of a polymer is sufficient as the location which an alkenyl radical combines with a polymer, and an end is sufficient as it. Preferably, it is introduced into the end of a polymer. When an alkenyl radical is in the end of a compound, there is an advantage, like the effective network chain density of the hardened material finally formed increases, crosslinking density becomes high, and the rubber-like hardened material of high intensity becomes is easy to be obtained.

[0029] The reaction which adds a "hydrosilylation reaction" to the double bond between the carbon atoms of a compound and carbon atoms with which a hydrosilyl compound has an alkenyl radical is said into this specification.

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[0045] In the one embodiment, the compound of the (A) component is a polyisobutylene system polymer. The approach of introducing an alkenyl radical into the polyisobutylene system polymer which has a covalent-bond nature Cl radical as the preparation approach of a polyisobutylene system polymer, for example is mentioned. Although there is especially no limit in the approach of introducing an alkenyl radical into the polyisobutylene system polymer which has a covalent-bond nature Cl radical For example, the method of performing an Friedel Crafts reaction between alkenyl phenyl ether and Cl radical of a polymer. After performing the Friedel Crafts reaction of the approach of carrying out the substitution reaction of an allyl compound trimethyl silane etc. and the Cl radical of a polymer under Lewis acid existence, and various phenols and Cl radical of a polymer and introducing a hydroxyl group, the method of performing the further aforementioned alkenyl radical installation approach etc. is mentioned.

[0046] Next, how to introduce an alkenyl radical during the polymerization of a polymer is explained.

[0047] As an approach of introducing an alkenyl radical during the polymerization of a polymer, an allyl compound trimethyl silane is added to the system of reaction to which the cationic polymerization of the cationic polymerization nature monomer containing an isobutylene is carried out under existence of an initiator, a chain transfer agent, and a catalyst, and there is a method of manufacturing the polyisobutylene system polymer which has an allyl compound end, for example.

[0048] Here, the compound which has the halogen atom combined with the compound or tertiary carbon atom which has the carbon atom combined with a halogen atom and ring carbon as for example, an initiator-cum-a chain transfer agent can be used. Lewis acid can be used as a catalyst.

[0049] Similarly, the approach of adding the nonconjugated diene like 1 and 9-deca diene or the alkenyloxy styrene like p-hexenyloxy styrene to the polymerization system of reaction is also possible.

[0050] Here, although the compounds (for example, BCl₃, Et₂AlCl, EtAlCl₂, AlCl₃, SnCl₄, TiCl₄, VCi₄, FeCl₃, BF₃ etc.) expressed with general formula MX'n (M is a metal atom and X' is a halogen atom) are mentioned as Lewis acid which may be used as a cationic polymerization catalyst, it is not limited to these. BCl₃, SnCl₄, BF₃ etc. are TiCl₄(s)4 desirable still more preferably among these Lewis acid. To the number of mols of an initiator-cum-a chain transfer agent, 0.1 to 10 times are desirable still more desirable, and it is 2 to 5 times the amount of the Lewis acid used of this.

[0051] Next, the (B) component used for the constituent of this invention is explained.

[0052] (B) As a compound which has the hydrosilyl radical of a component, the compound of the arbitration which contains two or more hydrosilyl radicals in intramolecular is usable.

[0053] The radical which has the hydrogen atom which a "hydrosilyl radical" is a silyl radical expressed with general formula: HnR(3-n) Si- (however, R is the radical of the monovalence of arbitration), and was combined with the silicon atom of the silyl radical concerned in this specification is said. When two hydrogen atoms (H) have combined with the same silicon atom (Si) for convenience in this specification, it calculates with two hydrosilyl radicals.

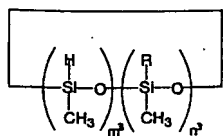
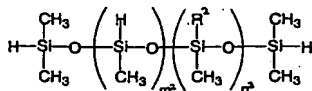
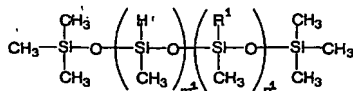
[0054] (B) A polyorgano hydrogen siloxane is mentioned as a desirable example of the compound of a component. A polyorgano hydrogen siloxane means the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. A siloxane compound is the shape for example, of a chain, or : [0055] which is annular, obtains and is shown by the following concrete for example, formulas.

[Formula 2]

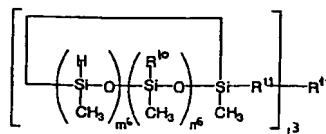
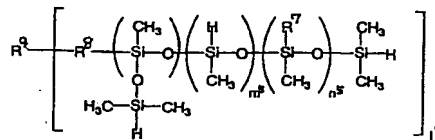
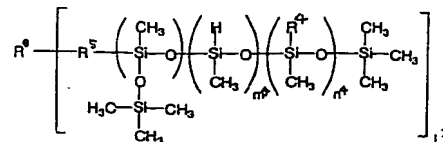
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[0056] (Here, it is $2 < n^1$, is $0 < n^1$, and is $2 < n^1 + n^2 < 50$, and R^1 is the hydrocarbon of carbon numbers 2-20, and R^1 may be permuted by one or more phenyl groups if needed.) Moreover, it is $0 < n^2$, is $0 < n^2$, and is $0 < n^2 + n^1 < 50$, and R^2 is the hydrocarbon of carbon numbers 2-20, and R^2 may be permuted by one or more phenyl groups if needed. $2 < n^3 < 19$ [moreover,] -- it is $0 < n^3$ -- it is $3 < n^3$, and is $3 < n^3 + n^2 < 20$, and R^3 is the hydrocarbon of carbon numbers 2-20, and R^3 may be permuted by one or more phenyl groups if needed. Or: [0057] which a siloxane compound may have two or more units of a siloxane, and is shown by the following concrete for example, formulas [Formula 3]



[0058] (Here, it is $1 < n^4$, is $0 < n^4$, and is $1 < n^4 + n^5 < 50$, and R^4 is the hydrocarbon of carbon numbers 2-20, and R^4 may be permuted by one or more phenyl groups if needed.) It is $2 < n^1$, and R^5 is a divalent organic radical, or R^5 does not need to exist. R^6 is the organic radical of 2 - tetravalence. Moreover, it is $0 < n^5$, is $0 < n^5$, and is $0 < n^5 + n^4 < 50$, and R^7 is the hydrocarbon of carbon numbers 2-20, and R^7 may be permuted by one or more phenyl groups if needed. It is $2 < n^2$, and R^8 is a divalent organic radical, or R^8 does not need to exist. R^9 is the organic radical of 2 - tetravalence. Moreover, it is $1 < n^6$, is $0 < n^6$, and is $3 < n^6 + n^5 < 50$, and R^{10} is the hydrocarbon of carbon numbers 2-20, and R^{10} may be permuted by one or more phenyl groups if needed. It is $2 < n^3$, and R^{11} is a divalent organic radical, or R^{11} does not need to exist. R^{12} is the organic radical of 2 - tetravalence.

(B) As for a component, what has good compatibility with the (A) component, the (C) component, the (D) component, or the (E) component or the distributed stability in a system is desirable. If compatibility with each above-mentioned component of the (B) component is low when especially the viscosity of the whole system is low, phase separation will tend to happen and it will be easy to cause poor hardening. For this reason, in order to prevent phase separation, a filler with small particle size, such as an impalpable powder silica, may be blended as a distributed assistant.

[0059] (A) The following concrete for example, compounds are mentioned as a (B) component with comparative good compatibility or distributed stability with a component, the (C) component, the (D) component, or the (E) component.

[0060]
[Formula 4]

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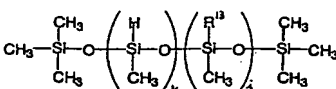
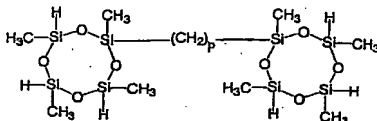
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[0061] (Here, p is 6-12.) Moreover, it is $2 < k < 10$, and is $0 < k < 5$, and R^{13} is a with a carbon numbers of eight or more hydrocarbon group.

(B) As for the amount of the component used, it is desirable to use it to the total number of mols of the alkenyl radical in the (A) component, so that the total number of mols of the silicon atomic union hydrogen atom of the (B) component may become 0.8-5.0Eq. To the alkenyl radical total amount of the above-mentioned (A) component, when there are too few silicon atomic union hydrogen atoms of the (B) component, bridge formation tends to become inadequate. Moreover, in many [too], a silicon atomic union hydrogen atom tends to remain after hardening, and physical properties tend to change with the effects of the hydrogen atom a lot. It is desirable to make the amount of the (B) component into 1.0-2.0Eq to control especially this effect.

[0062] (C) A component is a component which gives conductivity to the hardened material obtained from the constituent of this invention, or the constituent of this invention. (C) The compound which has the conductive unit represented with the organic compound which has carbon black or a metallic oxide, metal impalpable powder, quaternary ammonium salt, a carboxylic-acid radical, a sulfonic group, a sulfate radical, a phosphoric ester radical, etc. or a polymer, ether ester imide or an ether imide polymer, an ethyleneoxide-epihalohydrin copolymer, methoxy polyethylene-glycol acrylate, etc. as addition-of-conductivity matter of a component, or compounds, such as an antistatic agent of a high molecular compound, are mentioned.

[0063] As an example of the above-mentioned carbon black, furnace black, acetylene black, lamp black, channel black, thermal black, oil black, etc. are mentioned. There is no limit in the class of these carbon black, particle size, etc.

[0064] Here, since a hydrosilylation reaction may be checked depending on the class and addition of the addition-of-conductivity matter, it is desirable that the effect to a hydrosilylation reaction uses little addition-of-conductivity matter.

[0065] (C) The addition of a component can be chosen as arbitration according to the conductivity needed for the mold goods obtained. Preferably, it is the 0.1 - 200 weight section to the polymer 100 weight section of the (A) component, and the 1 - 100 weight section is more desirable. If there are too few additions, it will become easy to come to the conductivity of the conductive ingredient obtained out of variation. On the other hand, if an addition increases too much, the fluidity of a constituent will tend to fall and workability will tend to fall.

[0066] In one embodiment, it is added so that the range of the conductive volume resistivity in the hardened material obtained may serve as 105-ohmcm - 1013-ohmcm.

[0067] In a desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 107-1011ohm.

[0068] In another desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 103-109ohm.

[0069] In still more nearly another desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 105-1010ohm.

[0070] (D) As a hydrosilylation catalyst of a component, there is especially no limit and it can use the hydrosilylation catalyst of arbitration, the catalyst: platinum-vinyl siloxane complex which made support, such as chloroplatinic acid, a simple substance of platinum, an alumina, a silica, or carbon black, support solid-state platinum when illustrating concretely -- [for example $\text{Pt}(\text{V}(\text{Me})_2\text{SiOSiMe}_2\text{V})_n$ and a $\text{Pt}(\text{MeVSiO})_4$ m].

platinum-phosphine complex -- [for example a $\text{Pt}(\text{PPh}_3)_4$ and $\text{Pt}(\text{PBu}_3)_4$; platinum-phosphite complex -- [for example $\text{Pt}[\text{P}(\text{OPh})_3]_4$ $\text{Pt}[\text{P}(\text{OBu})_3]_4$ (Me expresses a methyl group among a formula) Bu expresses butyl, Vi expresses a vinyl group, and Ph expresses a phenyl group. The platinum-hydrocarbon complex indicated in United States patent 3159601st of Pt(acac)₂, Ashby and others with which n and m express an integer, and No. 3159682 specification. And the platinum alcoholate catalyst indicated in Lamoreaux's and others U.S. Pat. No. 3220972 specification is mentioned.

[0071] Moreover, as an example of catalysts other than a platinum compound, $\text{RhCl}(\text{PPh}_3)_3$, RhCl_3 , $\text{Rh}/\text{aluminum 2O}_3$, RuCl_3 , IrCl_3 , FeCl_3 and AlCl_3 , $\text{PdCl}_2 \cdot 2\text{H}_2\text{O}$, NiCl_2 , and TiCl_4 grade are mentioned. These catalysts may be used independently, and even if it uses two or more sorts together, they are not cared about. Chloroplatinic acid, a platinum-olefin complex, a platinum-vinyl siloxane complex, and $\text{Pt}(\text{acac})_2$ grade are desirable from the point of catalytic activity.

[0072] (D) Although especially the amount of the catalyst of a component is not restricted, its range of 10-1 to ten to 8 mol is desirable to one mol of alkenyl radicals in the (A) component. Preferably, it is the range of 10-2 to ten to 6 mol. Moreover, it is better many [since a hydrosilylation catalyst is generally expensive, and it is corrosive, and hydrogen gas is generated in large quantities and a hardened material may foam / too].

[0073] (E) The plasticizer of a component is a component for forming the conductive hardened material obtained into a low degree of hardness. Although there will be especially no limitation as this (E) component if said purpose can be attained, it is desirable that compatibility with 1 (A) component is good and that there is little volatile matter under 2 hardening conditions. That is, as a plasticizer of the (E) component, a polar low hydrocarbon system compound is desirable. For example, the substitution product of a hydrocarbon or a hydrocarbon is mentioned. As for a plasticizer, it is desirable that it is a with a carbon numbers of six or more compound, and its with a carbon numbers of eight or more compound is still more desirable. (E) As an example of a component, although the saturated hydrocarbon system process oil of molecular weight 350-1000 etc. is mentioned, it is not limited to these. (E) As for the loadings of a component, it is desirable to use below in the 11 - 100 weight section still more preferably below the 5 - 150 weight section preferably below the 1 - 200 weight section to the (A) component 100 weight section. If loadings exceed the 200 weight sections, it will become easy to produce problems, such as bleeding, and if fewer than 1 weight section, a degree of hardness cannot fully be lowered.

[0074] A preservation stability amelioration agent can be used for the constituent of this invention in order to improve preservation stability. The usual stabilizer known as a preservation stabilizer to the compound containing the hydrosilyl radical of the (B) component as this preservation stability amelioration agent, for example is usable, and is not limited especially. Specifically, the compound containing an aliphatic series unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably. Still more specifically 2-benzothiazolyl sulfide, benzothiazole, A thiazole, dimethyl acetylene die carboxylate, diethyl acetylene die carboxylate, BHT, butylhydroxyanisole, vitamin E, 2-(4-mol FOJ nil dithio) benzothiazole, 3-methyl-1-butene-3-oxar, an acetylene nature partial saturation radical content ORGANO siloxane. Although acetylene alcohol, 3-methyl-1-butyl-3-oxar diallyl fumarate, diallyl maleate, diethylfumarate, diethyl maleate, dimethyl maleate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned it is not limited to these.

[0075] In the conductive constituent of this invention, the hardened material of a good degree of hardness can be easily obtained by combination of component (A) - (E) mentioned above. However, if needed, a softener may be added in order to adjust the degree of hardness of a hardened material further. Below the 150 weight sections of the amount of the softener used are desirable to the (A) component 100 weight section. If it becomes an addition beyond it, it will be easy to produce problems, such as bleeding.

[0076] Next, the degree of hardness of a hardened material is explained.

[0077] The degree of hardness of a hardened material is JIS. It measures based on K8301. Specifically, it measures about the hardened material which hydrosilylated the constituent of this invention and was obtained, using A mold hardness tester as a measurement machine.

[0078] The degree of hardness of the hardened material which is made to harden the constituent of this invention and is obtained is 25 degrees or less in one embodiment. The degree of hardness of a hardened material may be easily adjusted by adjusting combination of the conductive constituent of this invention.

[0079] In the conductive constituent of this invention, the adhesion grant agent or tackifier for raising the adhesive property over various base materials (the metal heart, plastic film, metal foil, paper, etc.) can be added if needed which was mentioned above. As an example of an adhesion grant agent, various silane coupling agents or an epoxy resin is mentioned. The effect of especially the silane coupling agent that has functional groups, such as an epoxy group, a methacryloyl radical, and a vinyl group, affect hardenability is also small, and it is easy to use effectiveness also for an adhesive manifestation greatly. However, the silane coupling agent which can be

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used is not limited to these. Moreover, it may use together with a silane coupling agent or an epoxy resin, and these reaction catalysts may be added. If in charge of these use, the effect to a hydrosilylation reaction must be taken into consideration.

[0080] Moreover, there is especially no limitation in a tackifier and it can usually use the resin of the arbitration used as a tackifier for it. As an example, phenol resin, denaturation phenol resin, cyclopentadiene-phenol resin, xylene resin, cumarone resin, petroleum resin, terpene resin, terpene phenol resin, resin ester resin, etc. are mentioned. Especially in these, terpene system resin and petroleum resin of compatibility are good, and since the adhesion property is good, it is desirable.

[0081] In the conductive constituent of this invention, you may add suitably if needed for the engine performance of the mold goods which target various bulking agents, an antioxidant, an ultraviolet ray absorbent, a pigment, a surfactant, a solvent, a silicon compound, etc. As an example of said bulking agent, silica impalpable powder, a calcium carbonate, clay, talc, titanium oxide, a zinc white, the diatom earth, a barium sulfate, etc. are mentioned. Especially in these bulking agents, silica impalpable powder and the impalpable powder silica whose particle diameter is especially 50-70nm (BET specific surface area is 50-380m²/g) extent are desirable, and especially since the work to which the hydrophobic silica which performed surface treatment also in it improves reinforcement in the desirable direction is large, it is desirable.

[0082] The constituent of this invention is hardened by the addition reaction of the Si-H radical to the alkenyl radical which performed the precious metal catalyst. Therefore, a cure rate is very quick, and it is convenient when performing Rhine production.

[0083] The constituent of this invention fabricates and heat-hardens by the well-known approach conventionally, and forms conductive mold goods. For example, after pouring into the mold which has the shaping space of the configuration of requests of the constituent of this invention, such as a roller, the conductive mold goods of a desired configuration are obtained by heating.

[0084] Although it can specifically fabricate by liquefied injection molding, extrusion molding, press forming, etc., the point that a constituent is liquefied, and the point of productivity to liquefied injection molding is desirable.

[0085] The temperature to which heat curing of the constituent of this invention is carried out has desirable within the limits of 80 degrees C - 180 degrees C. If it becomes about 80 degrees C or more, a hydrosilylation reaction can advance rapidly and it can be made to harden by short time amount.

[0086] The conductive constituent of this invention is suitable as an ingredient which manufactures a conductive platen, and suitable for concrete for example, an electrification roller, a developing roller, an imprint roller, a feed roller, a cleaning roller, the pressurization roller for fixing, etc.

[0087] Especially the manufacture approach of the above-mentioned conductive platen is not limited, but the shaping approach of various well-known rollers can be conventionally used for it. For example, the above-mentioned hardenability conductivity constituent is fabricated by the various fabricating methods, such as extrusion molding, press forming, injection molding, reaction injection molding (RIM), liquefied injection molding (LIMS), and cast molding, the metal mold which installed metal shafts, such as a product made from SUS, in the core is made to carry out heat hardening by suitable temperature and time amount, and a conductive elastic layer is fabricated around a shaft to it. In this case, after carrying out semi-hardening of said hardenability conductivity constituent, it may establish and carry out full hardening of the process which carries out postcure separately. Furthermore, an unit or two or more layers may be prepared in the outside of said conductive elastic layer if needed. For example, from on said conductive elastic layer, the resin for surface layer formation can be applied to predetermined thickness a spray coating cloth or by carrying out DIP spreading, it can be made to be able to dry and harden at predetermined temperature, and a surface layer can be prepared.

[0088] The roller resistance in the above-mentioned conductive platen is suitably chosen according to the engine performance of a desired roller. The thing of the range whose roller resistance as a developing roller of the thing of the range whose roller resistance of the thing of the range whose roller resistance is 107-1011ohm is 103-109ohm as for example, an imprint roller is 105-1010ohm is usable for the application as for example, an electrification roller.

[0089] In addition, the loadings of the addition-of-conductivity matter which is the (C) component in the above-mentioned hardenability conductivity constituent can adjust roller resistance in the target range.

[0090] Here, roller resistance applies a roller at a level with a metal plate, and adds a 500g load to each of the both ends of the conductive shaft of a roller in the direction of a metal plate, and the electric resistance value measured by impressing the direct current voltage of 100 volts between a shaft and a metal plate is said.

[0091] [Example] Although this invention is further explained to a detail based on the following examples, this invention is not limited to these examples.

[0092] (Example 1) As a (A) component, the allyl compound end polyisobutylene polymer (the Kaneka make,

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(E) component into saturated hydrocarbon system process oil PW-90 (Idemitsu Kosan make). The result of a recipe and evaluation is shown in Table 2.

[0100] (Example 3) The sheet-like hardened material was obtained like the example 1 except having changed the (E) component into saturated hydrocarbon system process oil PAO5006 (product made from the Idemitsu petrochemistry). The result of a recipe and various evaluations is shown in Table 2.

[0101] (Example 1 of a comparison) The sheet-like hardened material was obtained like the example 1 except having not added the (E) component. The degree of hardness and volume resistivity of a sheet-like hardened material which were obtained were measured under conditions of the temperature of 23 degrees C, and 65**5% of humidity. A recipe and a result are shown in Table 2.

[Table 2]	
実施例 1	比較例 1
実施例 2	実施例 3
成分	成分
(A) 成分	(A) 成分
(B) 成分	(B) 成分
(C) 成分	(C) 成分
(D) 成分	(D) 成分
(E) 成分	(E) 成分
保存安定性試験	保存安定性試験
硬化防止剤	硬化防止剤
硬度 (HIS-H)	硬度 (HIS-H)
体積抵抗率	体積抵抗率
感光度試験値	感光度試験値

[0103] [Effect of the Invention] According to this invention, the conductive constituent for the conductive rollers of a low degree of hardness is obtained by adding to a constituent the compound which includes an aliphatic series unsaturated bond in the hydrosilylation addition reaction mold-curing system conductivity constituent containing

EP400A) was used. The structure expression is shown below and the analysis value is shown in Table 1.

[0093] [Formula 5]

$$\text{CH}_2=\text{CH}-\text{CH}_2-\left(\text{CH}_2-\text{CH}(\text{CH}_3)-\text{CH}_2\right)_n-\text{CH}_2-\text{CH}(\text{CH}_3)-\text{CH}_2-\left(\text{CH}_2-\text{CH}(\text{CH}_3)-\text{CH}_2\right)_n-\text{CH}_2-\text{CH}(\text{CH}_3)-\text{CH}_2$$

[0094] (Here, m7 and n7 are integers.)

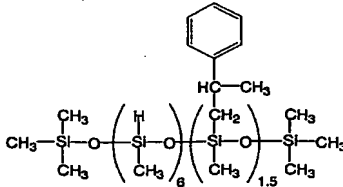
[0095] [Table 1]

分析項目	測定方法	測定値
数平均分子量 (Mn)	GPC	10400
重量平均分子量 (Mw)	GPC	12100
分散度	GPC	1.2
末端官能基数	¹ H-NMR	2.0

注1) GPC測定値はポリスチレン換算
注2) ¹H-NMR測定による末端官能基数は、開始剤残基に
対する末端官能基数を示す。

[0096] First, it is MARK as a (C) component to the (A) component 100 weight section as the saturated hydrocarbon system process oil (Idemitsu Kosan make PW-380) 50 weight section and an antioxidant as the carbon black (Asahi carbon company make #35) 20 weight section and a (E) component. The AO-50(product made from the Asahi electrification) 1 weight section was mixed, and it kneaded 3 times with a roll. Subsequently, 5.3 weight sections mixing of the compound B which has the following structures as a (B) component into this mixture was carried out to the (A) component 100 weight section.

[0097] [Formula 6]



[0098] Furthermore, the bis(1, 3-divinyl - 1, 1, 3, and 3-tetramethyl siloxane) platinum complex compound catalyst (17.9x10⁻⁵ mmol/mu l, xylene solution) was added to the number of mols of the amount of the alkenyl radical of the (A) component in the amount from which platinum becomes 5x10⁻⁴Eq as a (D) component. Subsequently, weighing capacity of the amount which turns into the 300-mol equivalent to platinum in 2-phenyl-3-butyne-2-ol as a preservation stability amelioration agent was carried out, and it mixed to homogeneity. Vacuum degassing churning equipment (product made from C Tech) performed the indirect desulfurization bubble into this mixture for 15 minutes. After filling up with this mixture the metal mold frame of the aluminum which covered with the Teflon sheet, in hot air drying equipment, it heated for 30 minutes and 150 degrees C of sheet-like hardened materials for evaluation were obtained. The degree of hardness and volume resistivity of a sheet-like hardened material which were obtained were measured under conditions of the temperature of 23 degrees C, and 65**5% of humidity. A recipe and a result are shown in Table 2. Moreover, the photo conductor was picked out from the body of an electrophotography machine, and where the sheet-like hardened material obtained by this photo conductor is pressed, it was left for seven days under conditions of the temperature of 50 degrees C, and 90% of humidity. Then, the photo conductor was returned to the body of an electrophotography machine, black solid and a halftone image were printed, and what a certain dirt is regarded as by O and the image in what has a good image was estimated as x. This result was shown in Table 2.

[0099] (Example 2) The sheet-like hardened material was obtained like the example 1 except having changed th

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the polyisobutylene system polymer which has an alkenyl radical, and the addition-of-conductivity matter as a storage stability amelioration agent.

[0104] If the conductive constituent of this invention is used, there will be no effect in the printing image by contamination of photo conductors which it has, such as an electrophotography machine, — low — a conductivity degree of hardness platen is offered.

[Translation done.]

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TECHNICAL FIELD

[Field of the Invention] This invention relates to the conductive platen produced from a conductive constituent and its conductive constituent. Specifically, the conductive constituent of this invention is related with the conductive platen of a low degree of hardness obtained from the conductive constituent of addition mold-curing nature and it which contain the compound which has at least two hydrosilyl radicals, a hydrosilylation catalyst, a plasticizer, and the addition-of-conductivity matter in the polyisobutylene system polymer which has in a molecule the alkenyl radical in which at least one hydrosilylation reaction is possible, and a molecule.

[Translation done.]

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JP,2001-011264,A [EFFECT OF THE INVENTION]

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the conductive constituent for the conductive rollers of a low degree of hardness is obtained by adding to a constituent the compound which includes an aliphatic series unsaturated bond in the hydrosilylation addition reaction mold-curing system conductivity constituent containing the polyisobutylene system polymer which has an alkenyl radical, and the addition-of-conductivity matter as a storage stability amelioration agent.

[0104] if the conductive constituent of this invention is used, there will be no effect in the printing image by contamination of photo conductors which it has, such as an electrophotography machine, -- low -- a conductive degree of hardness platen is offered.

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PRIOR ART

[Description of the Prior Art] An electrophotography machine or a printer has as one application of a conductive constituent, for example, the various rollers for form feed etc. are mentioned. As an ingredient used for the elastic body part of these rollers, many EPDM, urethane, NBR, silicone, etc. are used.

[0003] Moreover, the conductive constituent using a saturated hydrocarbon system polymer or a polyoxyalkylene series polymer is well-known, for example, is indicated by JP.8-282866,A. However, a platen of not necessarily enough low further a low degree of hardness [ingredient / such / conductive / degree of hardness] was desired.

[0004] However, for example, in the application of the roller for electrophotography machines etc., it is needed as physical properties that the above-mentioned ingredient is the low degree of hardness which it does not usually have.

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JP,2001-011264,A [TECHNICAL PROBLEM]

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TECHNICAL PROBLEM

[Problem(s) to be Solved by the Invention] Especially this invention aims at offering the conductive platen of a low degree of hardness without effect in the printing image by contamination of photo conductors which it has, such as an electrophotography machine, and the conductive ingredient for it.

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MEANS

[Means for Solving the Problem] this invention persons completed a header and this invention for the conductive constituent for the platen of a low degree of hardness being obtained by adding a plasticizer into the polyisobutylene system polymer which has the alkenyl radical in which a hydrosilylation reaction is possible, and the hardenability ingredient containing the curing agent, hydrosilylation catalyst, and addition-of-conductivity matter which have a hydrosilyl radical.

[0007] The conductive constituent of this invention is a polyisobutylene system polymer which has the alkenyl radical in which at least one hydrosilylation reaction is possible in (A) molecule containing following component (A) - (E):

(B) Compound which has at least two hydrosilyl radicals in a molecule;

(C) Addition-of-conductivity matter;

(D) Hydrosilylation catalyst; and the (E) plasticizer.

[0008] In the one embodiment, the alkenyl radical in which the hydrosilylation reaction in the polymer of the aforementioned (A) component is possible exists in the end of this polymer.

[0009] In the one embodiment, the total amount of the repeat unit of the isobutylene origin in the polymer of the aforementioned (A) component is 50 % of the weight or more.

[0010] It is the polyorgano hydrogen siloxane to which the compound of the aforementioned (B) component contains two or more hydrosilyl radicals in 1 molecule on the average in the one embodiment.

[0011] In the one embodiment, the amount of the silicon atomic union hydrogen atom in the compound of the aforementioned (B) component is 0.8-5Eq to the amount of the compound of the aforementioned (A) component.

[0012] In the one embodiment, the plasticizer of the aforementioned (E) component is saturated hydrocarbon system process oil.

[0013] In the one embodiment, the aforementioned (C) component is carbon black.

[0014] In the one embodiment, the degree of hardness (JIS A) of the hardened material which is made to harden said conductive constituent and is obtained becomes 25 degrees or less.

[0015] In another aspect of affairs of this invention, the conductive platen which is made to harden one of the above-mentioned constituents, and is obtained is offered.

[0016] In the one embodiment, the roller resistance is 107-1011ohm.

[0017] In the one embodiment, the roller resistance is 103-109ohm.

[0018] In the one embodiment, the roller resistance is 105-1010ohm.

[0019] The manufacture approach of the conductive platen which includes the process which stiffens one of the above-mentioned constituents in another aspect of affairs of this invention again is offered.

[0020] [Embodiment of the Invention] The (A) component used for the constituent of this invention is a polyisobutylene system polymer which has in a molecule one alkenyl radical in which a hydrosilylation reaction is possible at least. A polyisobutylene system polymer means what the monomeric unit which makes the frame of a polymer becomes mainly from an isobutylene unit here.

[0021] A polyisobutylene system polymer can be manufactured by the well-known approach by carrying out a polymerization, using an isobutylene as the main raw material. For example, it can manufacture by the approach indicated by JP.8-134220.A or JP.9-71811.A.

[0022] A polyisobutylene system polymer can carry out the polymerization of the isobutylene independently, or can carry out copolymerization with a copolymeric monomer, and, specifically, can be obtained. Or after carrying out copolymerization of an isobutylene and the diene series, it can obtain also by approaches, such as the approach of adding hydrogen.

[0023] As for the number average molecular weight (the GPC method, polystyrene conversion) of a

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which has a hydroxyl group in an end or a side chain, there is an approach to which an organic halogenated compound is made to react.

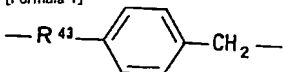
[0037] As an approach of making the hydroxyl group of a polymer an oxy-metal radical, the approach to which a polymer is made to react with caustic alkalis, such as metal alkoxides, such as metal hydrides, such as alkali metal, such as Na and K, and NaH, and NaOCH₃, caustic alkali of sodium, or caustic potash, is mentioned.

[0038] The organic halogenated compound made to react to the alkoxide of a polymer is :CH₂=CH-R41-Y shown by the following general formulas (1). (1)

Y is halogen atoms, such as a chlorine atom and an iodine atom, R41 is a divalent organic radical shown by -R42-, -R42-O-C(=O)-, or -R42-C(=O)-, and R42 is the divalent hydrocarbon group of carbon numbers 1-20 here. R42 is an alkylene group, a cyclo alkylene group, an arylene radical, and an aralkylene group preferably.

[0039] R41 is a methylene group or [0040] preferably.

[Formula 1]



[0041] It is chosen out of (R43) is the hydrocarbon group of carbon numbers 1-10).

[0042] As an example of the organic halogenated compound shown by said general formula (1), although an allyl chloride, an allyl compound star's picture, vinyl (chloro methyl) benzene, allyl compound (chloro methyl) benzene, allyl compound (bromomethyl) benzene, the allyl compound (chloro methyl) ether, allyl compound (chloro methoxy) benzene, 1-hexenyl (chloro methoxy) benzene, allyloxy (chloro methyl) benzene, etc. are mentioned, for example, it is not limited to them. Among these, an allyl chloride is desirable because of a cheap thing and the ease of a reaction.

[0043] An alkenyl radical content polymer with the almost same molecular weight as the polymer which contains the hydroxy group used as a start raw material by such approach is obtained.

[0044] On the other hand, before making the organic halogenated compound of a general formula (1) react, it can be made to be able to react with the multiple-valued organic halogenated compound which contains two or more halogen atoms in 1 molecules, such as a methylene chloride, bis(chloro methyl) benzene, or the bis(chloro methyl) ether, and molecular weight can be increased to obtain the polymer of the amount of macromolecules more. Thus, if it is made to react with the organic halogenated compound shown by the general formula (1) after increasing molecular weight, the polymer (for example, hydrogenation polybutadiene system polymer) which is the amount of giant molecules more, and has an alkenyl radical can be obtained.

[0045] In the one embodiment, the compound of the (A) component is a polyisobutylene system polymer. The approach of introducing an alkenyl radical into the polyisobutylene system polymer which has a covalent-bond nature Cl radical as the preparation approach of a polyisobutylene system polymer, for example is mentioned. Although there is especially no limit in the approach of introducing an alkenyl radical into the polyisobutylene system polymer which has a covalent-bond nature Cl radical For example, the method of performing an Friedel Crafts reaction between allyl phenyl ether and Cl radical of a polymer. After performing the Friedel Crafts reaction of the approach of carrying out the substitution reaction of an allyl compound trimethyl silane etc. and the Cl radical of a polymer under Lewis acid existence, and various phenols and Cl radical of a polymer and introducing a hydroxyl group, the method of performing the further aforementioned alkenyl radical installation approach etc. is mentioned.

[0046] Next, how to introduce an alkenyl radical during the polymerization of a polymer is explained.

[0047] As an approach of introducing an alkenyl radical during the polymerization of a polymer, an allyl compound trimethyl silane is added to the system of reaction to which the cationic polymerization of the cationic polymerization nature monomer containing an isobutylene is carried out under existence of an initiator, a chain transfer agent, and a catalyst, and there is a method of manufacturing the polyisobutylene system polymer which has an allyl compound end, for example.

[0048] Here, the compound which has the halogen atom combined with the compound or tertiary carbon atom which has the carbon atom combined with a halogen atom and ring carbon as for example, an initiator-cum-a chain transfer agent can be used. Lewis acid can be used as a catalyst.

[0049] Similarly, the approach of adding the nonconjugated diene like 1 and 9-deca diene or the alkenyloxy styrene like p-hexenyloxy styrene to the polymerization system of reaction is also possible.

[0050] Here, although the compounds (for example, BCl₃, Et₂AlCl, EtAlCl₂, AlCl₃, SnCl₄, TiCl₄, VCl₅, FeCl₃, BF₃, etc.) expressed with general formula MX_n (M is a metal atom and X' is a halogen atom) are mentioned as Lewis acid which may be used as a cationic polymerization catalyst, it is not limited to these. BCl₃, SnCl₄, BF₃, etc.

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polyisobutylene system polymer, 500 to about 100000 are desirable, and its liquefied object which is about 1000 to 40000 number average molecular weight is desirable especially from a viewpoint of a fluidity, the ease of dealing with it, etc.

[0024] A polyisobutylene system polymer may be a polymer which all the monomeric units may be formed [polymer] from the isobutylene unit, and carried out copolymerization of the monomer which has copolymeric to the isobutylene. When it contains such a copolymeric monomer, it is [in a polyisobutylene system polymer] desirable, and the content is 20 or less % of the weight especially preferably 30 or less % of the weight more preferably 50 or less % of the weight.

[0025] As a monomer which has an isobutylene and copolymeric, the olefin of carbon numbers 4-12, vinyl ether, an aromatic series vinyl compound, vinylsilane, and arylsilane are mentioned, for example.

[0026] As an example of the monomer which has an isobutylene and copolymeric For example, 1-butene, 2-butene, a 2-methyl-1-butene, a 3-methyl-1-butene, A pentene, 4-methyl-1-pentene, a hexene, a vinyl cyclohexane, The methyl vinyl ether, ethyl vinyl ether, isobutyl vinyl ether, Styrene, alpha methyl styrene, dimethyl styrene, p-t-butoxy styrene, p-hexenyloxy styrene, p-ant ROKISHI styrene, p-hydroxystyrene, beta-pinene, an indene, vinyl dimethylmethoxysilane, a vinyl trimethyl silane, Divinyl dimethoxysilane, divinyl dimethylsilane, 1, 3-divinyl - 1, 1, 3, and 3-tetramethyl disiloxane, TORIBI nil dimethylsilane, a tetravinyl silane, all compound dimethyl methoxysilane, An allyl compound trimethyl silane, diaryl dimethoxysilane, diaryl dimethylsilane, gamma-methacryloyl oxypropyl trimethoxysilane, gamma-methacryloyl oxypropyl methyl dimethoxysilane, etc. are mentioned.

[0027] The monomeric unit in which it is the range where the purpose of this invention is attained by the polyisobutylene system polymer, for example, double association remains after polymerizations, such as a polyene compound like butadiene, isoprene, 1, 13-tetra-deca diene, 1, 9-deca diene, 1, 7-OKUTA diene, 1, and 5-hexadiene, — small quantity — you may make it contain preferably in 10 or less % of the weight of the range in a polymer

[0028] (A) The polymer of a component contains the alkenyl radical in which a hydrosilylation reaction is possible. The side chain of a polymer is sufficient as the location which an alkenyl radical combines with a polymer, and an end is sufficient as it. Preferably, it is introduced into the end of a polymer. When an alkenyl radical is in the end of a compound, there is an advantage, like the effective network chain density of the hardened material finally formed increases, crosslinking density becomes high, and the rubber-like hardened material of high intensity becomes is easy to be obtained.

[0029] The reaction which adds a "hydrosilylation reaction" to the double bond between the carbon atoms of a compound and carbon atoms with which a hydrosilyl compound has an alkenyl radical is said into this specification.

[0030] The alkenyl radical in which a hydrosilylation reaction is possible will not be limited especially if it is a radical including carbon-carbon duplex association which has activity to a hydrosilylation reaction. As an example of such an alkenyl radical, ring type unsaturated hydrocarbon radicals, such as aliphatic series partial saturation hydrocarbon groups, such as a vinyl group, an allyl group, a methylvinyl radical, a propenyl radical, a butenyl group, a pentenyl radical, and a hexenyl radical, a cyclo propenyl radical, a cyclo butenyl group, a cyclo pentenyl radical, and a cyclohexenyl group, a methacrylic radical, etc. are mentioned. (A) As for a component, it is desirable to have 1-10 alkenyl radicals in 1 molecule.

[0031] However, it is especially desirable from moisture resistance, weatherability, and a heat-resistant viewpoint to consist of saturated hydrocarbon with which the frame of these polymers does not contain an ethylene nature unsaturated bond substantially except for the alkenyl radical in which a hydrosilylation reaction is possible.

[0032] The description of the conductive constituent of this invention is easy to set up the degree of hardness of a hardened material low. In order to make this description easy to demonstrate, as for an alkenyl radical, it is desirable to exist in two or more molecule ends.

[0033] The number of alkenyl radicals is suitably chosen depending on the engine performance of a request of a roller. If there are too many alkenyl radicals, a hardened material will tend to become upright, and good rubber elasticity becomes is hard to be obtained. If there are too few alkenyl radicals, it will fully be hard coming to harden a conductive constituent.

[0034] (A) In preparing the polymer of a component, as an approach of introducing an alkenyl radical, it divides roughly and there are an approach of introducing an alkenyl radical after the polymerization of a polymer and th approach of introducing during a polymerization.

[0035] First, how to introduce an alkenyl radical after the polymerization of a polymer is explained.

[0036] After converting the hydroxyl group of this polymer into radicals, such as -ONa or -OK., and obtaining a alkoxide as an approach of introducing an alkenyl radical after a polymerization, for example using the polymer

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are TiCl₄(s)4 desirable still more preferably among these Lewis acid. To the number of mols of an initiator-cum-a chain transfer agent, 0.1 to 10 times are desirable still more desirable, and it is 2 to 5 times the amount of the Lewis acid used of this.

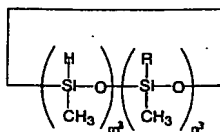
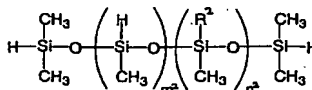
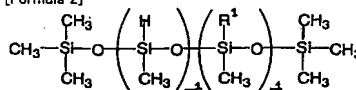
[0051] Next, the (B) component used for the constituent of this invention is explained.

[0052] (B) As a compound which has the hydrosilyl radical of a component, the compound of the arbitration which contains two or more hydrosilyl radicals in intramolecular is usable.

[0053] The radical which has the hydrogen atom which a "hydrosilyl radical" is a silyl radical expressed with general formula:HnR(3-n) Si- (however, R is the radical of the monovalence of arbitration), and was combined with the silicon atom of the alkenyl radical concerned in this specification is said. When two hydrogen atoms (H) have combined with the same silicon atom (Si) for convenience in this specification, it calculates with two hydrosilyl radicals.

[0054] (B) A polyorgano hydrogen siloxane is mentioned as a desirable example of the compound of a component. A polyorgano hydrogen siloxane means the siloxane compound which has a hydrocarbon group or a hydrogen atom on a silicon atom. A siloxane compound is the shape for example, of a chain, or : [0055] which is annular, obtains and is shown by the following concrete for example, formulas.

[Formula 2]

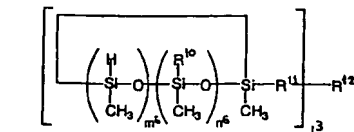
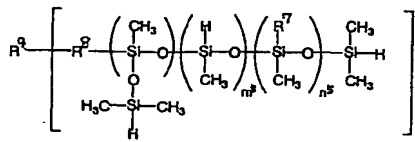
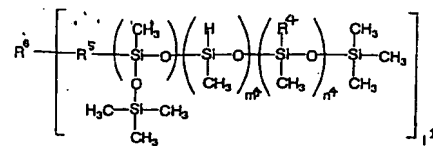


[0056] (Here, it is 2<m1, is 0 <=n1, and is 2 <=m1+n1 <=50, and R1 is the hydrocarbon of carbon numbers 2-20, and R1 may be permuted by one or more phenyl groups if needed.) Moreover, it is 0<m2, is 0 <=n2, and is 0 <=m2+n2 <=50, and R2 is the hydrocarbon of carbon numbers 2-20, and R2 may be permuted by one or more phenyl groups if needed. 2<m3 <=19 [moreover,] — it is — 0<=n — it is 3<18, and is 3 <=m3+n3 <=20, and R3 is the hydrocarbon of carbon numbers 2-20, and R3 may be permuted by one or more phenyl groups if needed. Or : [0057] which a siloxane compound may have two or more units of a siloxane, and is shown by the following concrete for example, formulas

[Formula 3]

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[0058] (Here, it is $1 \leq m \leq 4$, is $0 \leq n \leq 4$, and is $1 \leq m+n \leq 50$, and R4 is the hydrocarbon of carbon numbers 2-20, and R4 may be permuted by one or more phenyl groups if needed.) It is $2 \leq k \leq 10$, and R5 is a divalent organic radical, or R5 does not need to exist. R6 is the organic radical of 2-tetrahedral. Moreover, it is $0 \leq m \leq 5$, is $0 \leq n \leq 5$, and is $0 \leq m+n \leq 50$, and R7 is the hydrocarbon of carbon numbers 2-20, and R7 may be permuted by one or more phenyl groups if needed. It is $2 \leq k \leq 10$, and R8 is a divalent organic radical, or R8 does not need to exist. R9 is the organic radical of 2-tetrahedral. Moreover, it is $1 \leq m \leq 6$, is $0 \leq n \leq 6$, and is $3 \leq m+n \leq 50$, and R10 is the hydrocarbon of carbon numbers 2-20, and R10 may be permuted by one or more phenyl groups if needed. It is $2 \leq k \leq 10$, and R11 is a divalent organic radical, or R11 does not need to exist. R12 is the organic radical of 2-tetrahedral.

(B) As for a component, what has good compatibility with the (A) component, the (C) component, the (D) component, or the (E) component or the distributed stability in a system is desirable. If compatibility with each above-mentioned component of the (B) component is low when especially the viscosity of the whole system is low, phase separation will tend to happen and it will be easy to cause poor hardening. For this reason, in order to prevent phase separation, a filler with small particle size, such as an impalpable powder silica, may be blended as a distributed assistant.

[0059] (A) The following concrete for example, compounds are mentioned as a (B) component with comparatively good compatibility or distributed stability with a component, the (C) component, the (D) component, or the (E) component.

[0060]

[Formula 4]

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platinum-phosphine complex — [— for example a Pt (PPh₃)₄ and Pt(PBu₃)₄]; platinum-phosphite complex — [— for example Pt [P(OPh)₃] 4 Pt[P(OBu)₃] 4 (Me expresses a methyl group among a formula) Bu expresses butyl, Vi expresses a vinyl group, and Ph expresses a phenyl group. The platinum-hydrocarbon complex indicated in United States patent 3159601st of Pt (acac)₂, Ashby and others with which n and m express an integer, and a No. 3159662 specification, And the platinum alcoholate catalyst indicated in Lamoreaux's and others U.S. Pat. No. 3220972 specification is mentioned.

[0071] Moreover, as an example of catalysts other than a platinum compound, RhCl (PPh₃)₃, RhCl₃, Rh/aluminum 2O₃, RuCl₃, IrCl₃, FeCl₃ and AlCl₃, PdCl₂·2H₂O, NiCl₂, and TiCl₄ grade are mentioned. These catalysts may be used independently, and even if it uses two or more sorts together, they are not cared about. Chloroplatinic acid, a platinum-olefin complex, a platinum-vinyl siloxane complex, and Pt(acac)₂ grade are desirable from the point of catalytic activity.

[0072] (D) Although especially the amount of the catalyst of a component is not restricted, its range of 10-1 to ten to 8 mol is desirable to one mol of alkenyl radicals in the (A) component. Preferably, it is the range of 10-2 to ten to 6 mol. Moreover, it is better many [— since a hydrosilylation catalyst is generally expensive, and it is corrosive, and hydrogen gas is generated in large quantities and a hardened material may foam / too].

[0073] (E) The plasticizer of a component is a component for forming the conductive hardened material obtained into a low degree of hardness. Although there will be especially no limitation as this (E) component if said purpose can be attained, it is desirable that compatibility with (A) component is good and that there is little volatile matter under 2 hardening conditions. That is, as a plasticizer of the (E) component, a polar low hydrocarbon system compound is desirable. For example, the substitution product of a hydrocarbon or a hydrocarbon is mentioned. As for a plasticizer, it is desirable that it is with a carbon numbers of six or more compound, and its with a carbon numbers of eight or more compound is still more desirable. (E) As an example of a component, although the saturated hydrocarbon system process oil of molecular weight 350-1000 etc. is mentioned, it is not limited to these. (E) As for the loadings of a component, it is desirable to use below in the 10-100 weight section still more preferably below the 5-150 weight section preferably below the 1-200 weight section to the (A) component 100 weight section. If loadings exceed the 200 weight sections, it will become easy to produce problems, such as bleeding, and if fewer than 1 weight section, a degree of hardness cannot fully be lowered.

[0074] A preservation stability amelioration agent can be used for the constituent of this invention in order to improve preservation stability. The usual stabilizer known as a preservation stabilizer to the compound containing the hydrosilyl radical of the (B) component as this preservation stability amelioration agent, for example is usable, and is not limited especially. Specifically, the compound containing an aliphatic series unsaturated bond, an organic phosphorous compound, an organosulfur compound, a nitrogen content compound, a tin system compound, organic peroxide, etc. can be used suitably. Still more specifically 2-benzothiazolyl sulfide, benzothiazole, A thiazole, dimethyl acetylene di carboxylate, diethyl acetylene di carboxylate, BHT, butylhydroxyanisole, vitamin E, 2-(4-mol FOJIL nit dithio) benzothiazole, 3-methyl-1-butene-3-ol, an acetylene nature partial saturation radical compound ORGANO siloxane, Although acetylene alcohol, 3-methyl-1-butyl-3-ol, diallyl fumarate, diallyl maleate, diethyl fumarate, diethyl maleate, dimethyl maleate, 2-pentene nitril, 2, and 3-dichloropropene etc. is mentioned it is not limited to these.

[0075] In the conductive constituent of this invention, the hardened material of a good degree of hardness can be easily obtained by combination of component (A) - (E) mentioned above. However, if needed, a softener may be added in order to adjust the degree of hardness of a hardened material further. Below the 150 weight sections of the amount of the softener used are desirable to the (A) component 100 weight section. If it becomes an addition beyond it, it will be easy to produce problems, such as bleeding.

[0076] Next, the degree of hardness of a hardened material is explained.

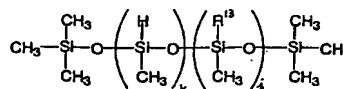
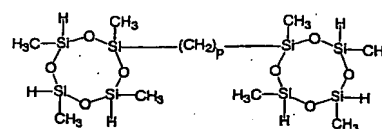
[0077] The degree of hardness of a hardened material is JIS. It measures based on K8301. Specifically, it measures about the hardened material which hydrosilylated the constituent of this invention and was obtained, using A mold hardness tester as a measurement machine.

[0078] The degree of hardness of the hardened material which is made to harden the constituent of this invention and is obtained is 25 degrees or less in one embodiment. The degree of hardness of a hardened material may be easily adjusted by adjusting combination of the conductive constituent of this invention.

[0079] In the conductive constituent of this invention, the adhesion grant agent or tackifier for raising the adhesive property over various base materials (the metal heart, plastic film, metal foil, paper, etc.) can be added if needed which was mentioned above. As an example of an adhesion grant agent, various silane coupling agents or an epoxy resin is mentioned. The effect of especially the silane coupling agent that has functional groups, such as an epoxy group, a methacryloyl radical, and a vinyl group, affect hardenability is also small, and it is easy to use effectiveness also for an adhesive manifestation greatly. However, the silane coupling agent which can be

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[0081] (Here, p is 6-12.) Moreover, it is $2 \leq k \leq 10$, and is $0 \leq j \leq 5$, and R13 is a with a carbon numbers of eight or more hydrocarbon group.

(B) As for the amount of the component used, it is desirable to use it to the total number of mols of the alkenyl radical in the (A) component, so that the total number of mols of the silicon atomic union hydrogen atom of the (B) component may become 0.8-5.0Eq. To the alkenyl radical total amount of the above-mentioned (A) component, when there are too few silicon atomic union hydrogen atoms of the (B) component, bridge formation tends to become inadequate. Moreover, in many [too], a silicon atomic union hydrogen atom tends to remain after hardening, and physical properties tend to change with the effects of the hydrogen atom a lot. It is desirable to make the amount of the (B) component into 1.0-2.0Eq to control especially this effect.

[0082] (C) A component is a component which gives conductivity to the hardened material obtained from the constituent of this invention, or the constituent of this invention. (C) The compound which has the conductive unit represented with the organic compound which has carbon black or a metallic oxide, metal impalpable powder, quaternary ammonium salt, a carboxylic-acid radical, a sulfonic group, a sulfite radical, a phosphoric ester radical, etc. or a polymer, ether ester imide or an ether imide polymer, an ethyleneoxide-epihalohydrin copolymer, methoxy polyethylene-glycol acrylate, etc. as addition-of-conductivity matter of a component, or compounds, such as an antistatic agent of a high molecular compound, are mentioned.

[0083] As an example of the above-mentioned carbon black, furnace black, acetylene black, lamp black, channel black, thermal black, oil black, etc. are mentioned. There is no limit in the class of these carbon black, particle size, etc.

[0084] Here, since a hydrosilylation reaction may be checked depending on the class and addition of the addition-of-conductivity matter, it is desirable that the effect to a hydrosilylation reaction uses little addition-of-conductivity matter.

[0085] (C) The addition of a component can be chosen as arbitration according to the conductivity needed for the mold goods obtained. Preferably, it is the 0.1-200 weight section to the polymer 100 weight section of the (A) component, and the 1-100 weight section is more desirable. If there are too few additions, it will become easy to come to the conductivity of the conductive ingredient obtained out of variation. On the other hand, if an addition increases too much, the fluidity of a constituent will tend to fall and workability will tend to fall.

[0086] In one embodiment, it is added so that the range of the conductive volume resistivity in the hardened material obtained may serve as 105-ohmcm - 1013-ohmcm.

[0087] In a desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 107-1011ohm.

[0088] In another desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 103-109ohm.

[0089] In still more nearly another desirable embodiment, it is added so that the range of the roller resistance obtained may be set to 105-1010ohm.

[0090] (D) As a hydrosilylation catalyst of a component, there is especially no limit and it can use the hydrosilylation catalyst of arbitration, the catalyst: platinum-vinyl siloxane complex which made support, such as chloroplatinic acid, a simple substance of platinum, an alumina, a silica, or carbon black, support solid-state platinum when illustrating concretely — [— for example Pt(nVIMe2SiOSiMe2Vi) n and a Pt[(MeViSiO)4] m].

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used is not limited to these. Moreover, it may use together with a silane coupling agent or an epoxy resin, and these reaction catalysts may be added. If in charge of these use, the effect to a hydrosilylation reaction must be taken into consideration.

[0090] Moreover, there is especially no limitation in a tackifier and it can usually use the resin of the arbitration used as a tackifier for it. As an example, phenol resin, denaturation phenol resin, cyclopentadiene-phenol resin, xylene resin, cumarone resin, petroleum resin, terpene resin, terpene phenol resin, resin ester resin, etc. are mentioned. Especially in these, terpene system resin and petroleum resin of compatibility are good, and since th adhesion property is good, it is desirable.

[0091] In the conductive constituent of this invention, you may add suitably if needed for the engine performance of the mold goods which target various bulking agents, an antioxidant, an ultraviolet ray absorbent, a pigment, a surfactant, a solvent, a silicon compound, etc. As an example of said bulking agent, silica impalpable powder, a calcium carbonate, clay, talc, titanium oxide, a zinc white, the diatom earth, a barium sulfate, etc. are mentioned. Especially in these bulking agents, silica impalpable powder and the impalpable powder silica whose particle diameter is especially 50-70nm (BET specific surface area is 50-380m²/g) extent are desirable, and especially since the work to which the hydrophobic silica which performed surface treatment also in it improves reinforcement in the desirable direction is large, it is desirable.

[0092] The constituent of this invention is hardened by the addition reaction of the Si-H radical to the alkenyl radical which used the precious metal catalyst. Therefore, a cure rate is very quick, and it is convenient when performing Rhine production.

[0093] The constituent of this invention fabricates and heat-hardens by the well-known approach conventionally, and forms conductive mold goods. For example, after pouring into the mold which has the shapin space of the configuration of requests of the constituent of this invention, such as a roller, the conductive mold goods of a desired configuration are obtained by heating.

[0094] Although it can specifically fabricate by liquefied injection molding, extrusion molding, press forming, etc., the point that a constituent is liquefied, and the point of productivity to liquefied injection molding is desirable.

[0095] The temperature to which heat curing of the constituent of this invention is carried out has desirable within the limits of 80 degrees C - 180 degrees C. If it becomes about 80 degrees C or more, a hydrosilylation reaction can advance rapidly and it can be made to harden by short time amount.

[0096] The conductive constituent of this invention is suitable as an ingredient which manufactures a conductive platen, and suitable for concrete for example, an electrification roller, a developing roller, an imprint roller, a fee roller, a cleaning roller, the pressurization roller for fixing, etc.

[0097] Especially the manufacture approach of the above-mentioned conductive platen is not limited, but the shaping approach of various well-known rollers can be conventionally used for it. For example, the above-mentioned hardenability conductivity constituent is fabricated by the various fabricating methods, such as extrusion molding, press forming, injection molding, reaction injection molding (RIM), liquefied injection molding (LIMS), and cast molding, the metal mold which installed metal shafts, such as a product made from SUS, in the core is made to carry out heat hardening by suitable temperature and time amount, and a conductive elastic layer is fabricated around a shaft to it. In this case, after carrying out semi-hardening of said hardenability conductivity constituent, it may establish and carry out full hardening of the process which carries out posture separately. Furthermore, an unit or two or more layers may be prepared in the outside of said conductive elastic layer if needed. For example, from on said conductive elastic layer, the resin for surface layer formation can be applied to predetermined thickness a spray coating cloth or by carrying out DIP spreading, it can be made to be able to dry and harden at predetermined temperature, and a surface layer can be prepared.

[0098] The roller resistance in the above-mentioned conductive platen is suitably chosen according to the engine performance of a desired roller. The thing of the range whose roller resistance as a developing roller of the thing of the range whose roller resistance of the thing of the range whose roller resistance is 107-1011ohm is 103-109ohm as for example, an imprint roller is 105-1010ohm is usable for the application as for example, an electrification roller.

[0099] In addition, the loadings of the addition-of-conductivity matter which is the (C) component in the above-mentioned hardenability conductivity constituent can adjust roller resistance in the target range.

[0100] Here, roller resistance applies a roller at a level with a metal plate, and adds a 500g load to each of the both ends of the conductive shaft of a roller in the direction of a metal plate, and the electric resistance value measured by impressing the direct current voltage of 100 volts between a shaft and a metal plate is said.

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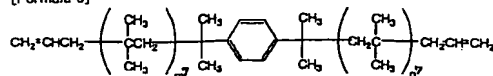
EXAMPLE

[Example] Although this invention is further explained to a detail based on the following examples, this invention is not limited to these examples.

[0092] (Example 1) As a (A) component, the allyl compound and polyisobutylene polymer (the Kaneka make, EP400A) was used. The structure expression is shown below and the analysis value is shown in Table 1.

[0093]

[Formula 5]



[0094] (Here, m and n are integers.)

[0095]

[Table 1]

分析項目	測定方法	測定値
数平均分子量 (Mn)	GPC	10400
重量平均分子量 (Mw)	GPC	12100
分散度	GPC	1.2
末端官能基数	¹ H-NMR	2.0

注1) GPC測定値はポリスチレン換算

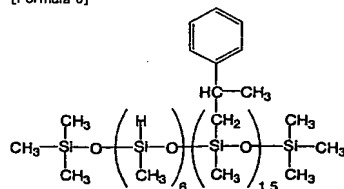
注2) ¹H-NMR測定による末端官能基数は、開始剤残基に

対する末端官能基数を示す。

[0096] First, it is MARK as a (C) component to the (A) component 100 weight section as the saturated hydrocarbon system process oil (Idemitsu Kosan make PW-380) 50 weight section and an antioxidant as the carbon black (Asahi carbon company make #35) 20 weight section and a (E) component. The AO-50 (product made from the Asahi electrification) 1 weight section was mixed, and it kneaded 3 times with a roll. Subsequently, 5.3 weight sections mixing of the compound B which has the following structures as a (B) component into this mixture was carried out to the (A) component 100 weight section.

[0097]

[Formula 6]



[0098] Furthermore, the bis(1,3-divinyl-1,1,3,3-tetramethyl disiloxane) platinum complex compound catalyst (17.9x10⁻⁵ mmol/μl, xylene solution) was added to the number of mols of the amount of the alkenyl

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比較例 1	実施例 3	実施例 2	実施例 1	実施例 4	実施例 5
2	100	100	100	100	100
5.3	5.3	5.3	5.3	5.3	5.3
10	10	10	10	10	10
57	57	57	57	57	57
50	50	50	50	50	50
50	50	50	50	50	50
0.4	0.4	0.4	0.4	0.4	0.4
1	1	1	1	1	1
14	14	14	14	14	14
28	28	28	28	28	28
5.7x10 ⁷	5.7x10 ⁷	5.7x10 ⁷	5.7x10 ⁷	5.7x10 ⁷	5.7x10 ⁷
未測定	未測定	未測定	未測定	未測定	未測定

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EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the conductive constituent for the conductive rollers of a low degree of hardness is obtained by adding to a constituent the compound which includes an aliphatic series unsaturated bond in the hydrosilylation addition reaction mold-curing system conductivity constituent containing the polyisobutylene system polymer which has an alkenyl radical, and the addition-of-conductivity matter as a storage stability amelioration agent.

[0104] low [which will not have effect in the printing image by contamination of photo conductors which it has, such as an electrophotography machine, if the conductive constituent of this invention is used] — a conductive degree of hardness platen is offered.

[Translation done.]

[Translation done.]

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